IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Duo Deng
Serial Number:	10/713,552
Filed:	November 14, 2003
Group Art Unit:	2836
Examiner:	Amrany, Adi
Title:	Two-Level Protection for Uninterrupted Power Supply

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF

Dear Sir:

Appellant submits its Brief subsequent to the filing of a Notice of Appeal on July 15, 2008. Fees in the amount of $540.00 are believed to be due. Any additional amount may be charged to Deposit Account No. 50-1482 in the name of Carlson, Gaskey & Olds.

Real Party in Interest

The real party in interest in this application is Continental AG.

Related Appeals and Interferences

There are no related appeals or interferences.

Status of Claims

The application included claims 1-25. Claims 1-25 stand rejected and are pending in the application.

Status of Amendments

All amendments have been entered.

Summary of Claimed Subject Matter

As shown below in Figure 1 from the application, the application is directed to a two-level protection for an uninterrupted power supply.

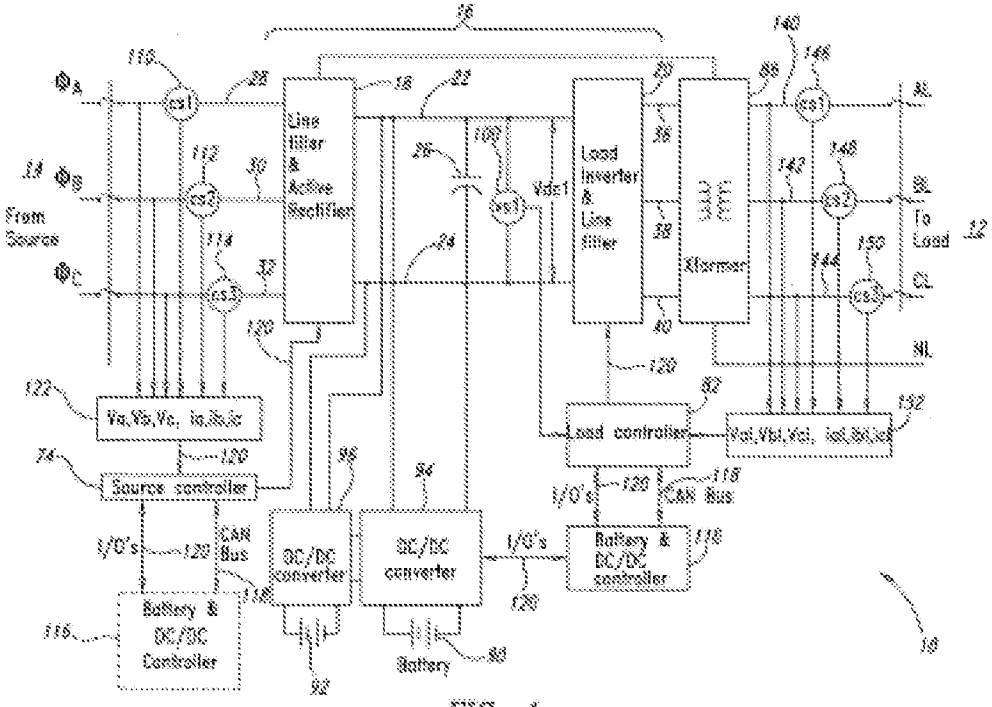

FIG. 1

The application includes 4 independent Claims 1, 10, 19, and 21. Independent claim 1 is directed to a method for responding to power source irregularities within an uninterruptible power supply system 10. The uninterruptible power source 10 contains a DC bus 22, 24 as well as a load side inverter 20 connected to an AC load 12 and a line side inverter 18 connected to a three phase AC power source 14. [See Figure 1, page 10 lines 9-16, and page 12 lines 15-25] The method establishes a threshold which indicates an irregularity, and a second (higher) threshold which indicates a different irregularity. The method monitors the DC voltage across

the DC bus 22, 24 and compares the DC voltage to a first and a second threshold. When the DC bus voltage exceeds the first threshold, but not the second threshold DC power is supplied from both the AC source 14 and a DC power supply 90, 92. When the DC bus voltage exceeds both thresholds power is supplied only from the DC power supply 90, 92. [See page 10 lines 9-16 and page 12 lines 15-25]

Independent claim 10 is directed to a means for performing the method of claim 1, and comprises an apparatus which responds to power source irregularities within an uninterruptible power supply system 10. The uninterruptible power source 10 contains a DC bus 22, 24 as well as a load side inverter 20 connected to an AC load 12 and a line side inverter 18 connected to a three phase AC power source 14. [See Figure 1, page 10 lines 9-16, and page 12 lines 15-25] The apparatus contains a means for establishing a threshold which indicates an irregularity, and a second (higher) threshold which indicates a different irregularity. The apparatus contains a means for monitoring the DC voltage across the DC bus 22, 24 and compares the DC voltage to a first and second threshold. When the DC bus voltage exceeds the first threshold, but not the second threshold DC power is supplied from both the AC source 14 and a DC power supply 90, 92. When the DC bus voltage exceeds both thresholds power is supplied only from the DC power supply 90, 92. [See page 10 lines 9-16 and page 12 lines 15-25]

Independent claim 19 is directed to a method for responding to power source irregularities within an uninterruptible power supply system 10. The uninterruptible power source 10 contains a DC bus 22, 24 as well as a load side inverter 20 connected to an AC load 12 and a line side inverter 18 connected to an AC power source 14. [See Figure 1 and page 10 lines 9-16] The method establishes a threshold which indicates an irregularity, and a second (higher) threshold which indicates a different irregularity. The method monitors the DC voltage across the DC bus 22, 24 and compares the DC voltage to a first and a second threshold. When the DC bus voltage exceeds the first threshold, but not the second threshold DC power is supplied from both the AC source 14 and a DC power supply 90, 92. When the DC bus voltage exceeds both

thresholds power is supplied only from the DC power supply 90, 92. [See page 10 lines 9-16 and page 12 lines 15-25]

Independent claim 21 is directed to an apparatus for responding to power source irregularities in an uninterruptible power supply system. The apparatus monitors the voltage across a DC bus 22, 24 of a UPS via a voltage sensor 100. The voltage sensor 100 is connected to a controller 74/82 which performs the method of either claim 1 or claim 19. The controller 82/116 is configured to provide control signals to the AC source 14, the DC power supply 90/92, a source converter 18 or a line converter 20. [See Figure 1 and page 11 lines 4-26] The controller 74/82 sends signals instructing the UPS to supply power from both a DC power source 90/92 and an AC power source 14 when the DC bus voltage exceeds a certain threshold but not a second threshold, and instructing the UPS to supply power from only a DC power source 90/92 when both thresholds are exceeded. [See page 10 lines 9-16, Page 11 lines 4-26, and page 12 lines 15-25]

Grounds of Rejection to be Reviewed on Appeal

I. Claims 1-5, 8-14, 17-23, and 25 were rejected under 35 U.S.C. §103(a) as being unpatentable over US Patent 5,612,580 to Janonis (hereafter "Janonis") in view of US Patent 5,633,539 to Tasitino (hereafter "Tasitino") and US Patent 5,939,799 to Weinstein (hereafter "Weinstein").

II. Claims 6-7, 15-16, and 24 were rejected under 35 U.S.C. §103(a) as being unpatentable over Janonis in view of Tasitino, Weinstein, and US Patent 6,295,215 to Faria (hereafter "Faria").

Argument

I. Rejection of Claims 1-5, 8-14, 17-23, and 25 under §103(a)

a. All Claims

Regarding independent claims 1, 10, 19, and 21; each of the independent claims contains the "monitoring a DC bus voltage on the DC bus" element. The examiner uses Janonis as the primary reference and contends that modification of Janonis according to Tasitino and Weinstein would result in the claimed invention. The examiner admits that Janonis does not show the necessary element of "monitoring a DC bus voltage on the DC bus", but contends that "it would have been obvious to one skilled in the art to combine the AC voltage detecting UPS systems disclosed in Janonis and Tasitino with the DC voltage detecting UPS disclosed in Weinstein in order to detect a failure of the AC/DC converter." (Page 4 of the examiner's comments in his office action dated April 15, 2008).

The examiner interprets Janonis as monitoring *either* AC amplitude *or* another input power trait (such as frequency). This is evidenced by the examiner's comment in the advisory action dated July 2, 2008 that "disturbances in the amplitude will still be measurable after the AC voltage is rectified to DC. Thus combining Janonis with Tasitino and Weinstein does not destroy the operability of the Janonis UPS," as well as his statement in the April 15th office action that "Janonis only requires measuring the voltage level to detect a brownout or other event that requires activating the backup power supply. The Janonis system will activate the backup power supply even without a detected change in AC frequency." (Emphasis added).

Respectfully, the interpretation that Janonis may use only one of the disclosed power traits (ie AC amplitude, AC frequency, or waveform characteristics) and still maintain its disclosed functionality is inconsistent with the disclosure of Janonis, and is therefore incorrect. The disclosure of Janonis requires a monitoring of all the AC power input attributes including the frequency. Janonis switches to an online mode "when the power source line voltage drops below a first threshold value but exceeds a second threshold voltage, *or the frequency of the power source line exceeds a predetermined range.*" (Abstract, Janonis).

The specification and claims of Janonis clearly disclose a device that detects multiple AC power line characteristics, and alters its behavior when any of those characteristics indicates an irregularity. Modifying Janonis in view of Tasitino and Weinstein by monitoring the DC bus instead of the AC power source would render it incapable of detecting any power irregularities

other than a change in voltage, thereby destroying a key element of its functionality. Additional support for the applicant's interpretation of Janonis can be found in the specification at Column 2 Lines 30-35 and independent claim 6.

The modification of Janonis in view of Tasitino and Weinstein to sense a DC bus voltage instead of an AC power source would destroy functionality and elements of the claims of Janonis and as such would not be obvious under 35 U.S.C. §103(a), and the examiner's rejection fails and should be withdrawn.

II. Rejection of Claims 6-7, 15-16, and 24

a. All Claims

For the reasons described in argument section I, the combination of Janonis in view of Tasitino and Weinstein would not be obvious because modifying the device of Janonis to detect the voltage on a DC bus would destroy the functionality of Janonis. Claims 6-7, 15-16, and 24 contain the same "monitoring a DC voltage on a DC bus" clause by virtue of their dependence, and as such any combination must disclose or make obvious this element. The addition of Faria does not cure the defect described in argument section I, and as such the 35 U.S.C. §103(a) rejection of claims 6-7, 15-16, and 24 fails for the same reasons and should be withdrawn.

CLOSING

For the reasons set forth above, the final rejection of claims 1-25 are improper and should be reversed.

Respectfully submitted,

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Dated: October 15, 2008

CLAIMS APPENDIX

1. A method for responding to electrical power source irregularities in an uninterruptible power supply system utilizing a rechargeable DC power supply as back up power, comprising:

providing an uninterruptible power supply system comprising a three phase AC source converter connectable to a three phase AC power source and a three phase AC load converter connectable to a three phase load, wherein the converters are interconnected by a DC bus;

monitoring DC bus voltage on the DC bus;

establishing a first DC bus voltage threshold indicative of a first power source irregularity and a second DC bus voltage threshold indicative of a second and distinct power source irregularity, wherein the first threshold is greater than the second threshold;

comparing the DC bus voltage to the first and second thresholds;

commuting electrical power from both the power source and from the DC power supply at the same time to the DC bus when the DC bus voltage is intermediate the first and second thresholds; and,

conversely commuting electrical power only from the DC power supply to the DC bus when the DC bus voltage is less than the second threshold, and disabling the source converter.

2. The method of claim 1, wherein the three phase AC power source is a public power grid.

3. The method of claim 2, wherein the first power source irregularity is a transitory power source instability and the second power source irregularity is a power source failure.

4. The method of claim 1, wherein the first power source irregularity is a transitory power source instability and the second power source irregularity is a power source failure.

5. The method of claim 1, further comprising establishing predetermined quality criteria for acceptable power source quality, monitoring power source voltage and current parameters for each phase on an input side of the source converter and commuting electrical power only from the DC power supply to the DC bus and disabling the source converter when the power source voltage fails to meet the predetermined quality criteria indicative of a power source failure.

6. The method of claim 5, further comprising monitoring instantaneous load voltage and current parameters for each phase on an output side of the load converter, calculating a load power demand value from the instantaneous parameters, and when a transient power source irregularity is indicated, generating a command signal to the DC power supply indicative of additional current needed by the load to supplant power lost from the AC power source due to the irregularity.

7. The method of claim 1, further comprising monitoring instantaneous load voltage and current parameters for each phase on an output side of the load converter, calculating a load power demand value from the instantaneous parameters, and when a transient power supply irregularity is indicated, generating a command signal to the DC power supply indicative of additional current needed by the load to supplant power lost from the AC power source due to the irregularity.

8. The method of claim 1, further comprising providing a plurality of rechargeable DC power supplies connected in parallel to each other and to the DC bus, and using power from each DC power supply sequentially when a power source irregularity is indicated.

9. The method of claim 1, wherein the first DC bus voltage threshold is approximately 710 Volts and the second DC bus voltage threshold is approximately 680 Volts.

10. An apparatus for responding to electrical power source irregularities in an uninterruptible power supply system comprising a rechargeable DC power supply interconnected to a DC bus, comprising:

an uninterruptible power supply system comprising a three phase AC source converter connectable to a three phase AC power source and a three phase AC load converter connectable to a three phase load, wherein the converters are interconnected by a DC bus;

means for monitoring DC bus voltage on the DC bus;

establishing means for establishing a first DC bus voltage threshold indicative of a first power source irregularity and a second DC bus voltage threshold indicative of a second and distinct power source irregularity, wherein the first threshold is greater than the second threshold;

comparing means for comparing the DC bus voltage to the first and second thresholds; and

commuting means for commuting electrical power from at least one of the power source and the DC power supply to the DC bus when the DC bus voltage is intermediate the first and second thresholds, and for conversely commuting electrical power only from the DC power supply to the DC bus when the DC bus voltage is less than the second threshold and for disabling the source converter.

11. The apparatus of claim 10, wherein the three phase AC power source is a public power grid.

12. The apparatus of claim 11, wherein the first power source irregularity is a transitory source instability and the second power source irregularity is a power source failure.

13. The apparatus of claim 10, wherein the first power source irregularity is a transitory power source instability and the second power source irregularity is a power source failure.

14. The apparatus of claim 10, further comprising grid failure establishing means for establishing predetermined quality criteria for acceptable power source quality, power source monitoring means for monitoring source voltage and current parameters for each phase on an input side of the source converter and power source failure commuting means for commuting electrical power only from the DC power supply to the DC bus and disabling the source converter when the source voltage fails to meet the predetermined quality criteria indicative of a power source failure.

15. The apparatus of claim 14, further comprising instantaneous monitoring means for monitoring instantaneous load voltage and current parameters for each phase on an output side of the load converter, load power calculating means for calculating a load power demand value from the instantaneous parameters, transient power supplying means for supplying power to the DC bus from the DC power supply when a transient power source irregularity is indicated, and command signal generating means for generating a command signal to the DC power supply indicative of additional current needed by the load to supplant power lost from the AC power source due to the irregularity.

16. The apparatus of claim 10, further comprising instantaneous monitoring means for monitoring instantaneous load voltage and current parameters for each phase on an output side of the load converter, load power calculating means for calculating a load power demand value from the instantaneous parameters, and command signal generating means for generating a command signal to the DC power supply indicative of additional current needed by the load to supplant power lost from the AC power source due to the irregularity.

17. The apparatus of claim 10, further comprising a plurality of rechargeable DC power supplies connected in parallel to each other and to the DC bus, and sequential DC power

control means for using power from each DC power supply sequentially when a power source irregularity is indicated.

18. The apparatus of claim 10, wherein the first DC bus voltage threshold is approximately 710 Volts and the second DC bus voltage threshold is approximately 680 Volts.

19. A method for responding to electrical power source irregularities in an uninterruptible power supply system, comprising:

providing an uninterruptible power supply system comprising an AC source converter connectable to an AC power source and an AC load converter connectable to a load, wherein the converters are interconnected by a DC bus;

interconnecting a rechargeable DC power supply to the DC bus;

monitoring DC bus voltage on the DC bus;

establishing a first DC bus voltage threshold indicative of a first power source irregularity and a second DC bus voltage threshold indicative of a second and distinct power source irregularity, wherein the first threshold is greater than the second threshold;

comparing the DC bus voltage to the first and second thresholds;

commuting electrical power from both the power source and from the DC power supply at the same time to the DC bus when the DC bus voltage is intermediate the first and second thresholds; and,

conversely commuting electrical power only from the DC power supply to the DC bus when the DC bus voltage is less than the second threshold, and disabling the source converter.

20. The method of claim 19, further comprising establishing predetermined quality criteria for acceptable power source quality, monitoring power source voltage and current parameters for each phase on an input side of the source converter and commuting electrical power only from the DC power supply to the DC bus and disabling the source converter when the power source voltage fails to meet the predetermined quality criteria indicative of a power source failure.

21. An apparatus for responding to electrical power source irregularities in an uninterruptible power supply system comprising a rechargeable DC power supply interconnected to a DC bus, comprising:

an uninterruptible power supply system comprising a three phase AC source converter connectable to a three phase AC power source and a three phase AC load converter connectable to a three phase load, wherein the converters are interconnected by a DC bus;

a number of voltage sensors coupled to sense DC bus voltage on the DC bus;

a controller configured to compare the DC bus voltage to a first DC bus voltage threshold indicative of a first power source irregularity and a second DC bus voltage threshold indicative of a second and distinct power source irregularity, wherein the first threshold is greater than the second threshold; and further configured to provide control signals to at least one of the three phase AC source converter and the three phase AC load converter to commute electrical power from both the power source and from the DC power supply at the same time to the DC bus when the DC bus voltage is intermediate the first and second thresholds, and for conversely commuting electrical power only from the DC power supply to the DC bus when the DC bus voltage is less than the second threshold and for disabling the source converter.

22. The apparatus of claim 21, wherein the first power source irregularity is a transitory source instability and the second power source irregularity is a power source failure.

23. The apparatus of claim 21, further comprising:

a number of power source voltage sensors coupled to sense a source voltage for each phase on an input side of the source converter, and

a number of power source current sensors coupled to sense a source current for each phase the input side of the source converter, wherein the controller is further configured to commute electrical power only from the DC power supply to the DC bus and disabling the source converter when the source voltage fails to meet a predetermined quality criteria indicative of a power source failure.

24. The apparatus of claim 23, further comprising:

a number of voltage sensors coupled to instantaneously sense load voltage for each phase on an output side of the load converter,

a number of current sensors coupled to instantaneously sense load current for each phase on an output side of the load converter, wherein the controller is further configured to calculate a load power demand value from the instantaneous load voltage and the instantaneous load current,

a transient power switch selectively operable to couple the DC power supply to the DC bus to supply power from the DC power supply when a transient power source irregularity is indicated; wherein the controller is further configured to generate a command signal to the DC power supply indicative of additional current needed by the load to supplant power lost from the AC power source due to the irregularity.

25. The apparatus of claim 21, further comprising:

a plurality of rechargeable DC power supplies connected in parallel to each other and to the DC bus, wherein the controller is configured to use power from each DC power supply sequentially when a power source irregularity is indicated.

EVIDENCE APPENDIX

None.

RELATED PROCEEDINGS APPENDIX

None.